

AD-A080 910 AEROSPACE MEDICAL RESEARCH LAB WRIGHT-PATTERSON AFB OH F/O 1/2
USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK, VOLUME 142, F-101B I--ETC(U)
AUG 79 H K HILLE
UNCLASSIFIED AMRL-TR-79-55-VOL-142 ML

F/O 1/2

USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK, VOLUME 142, F-101B I--ETC(U)

AUG 79 H K HILLE

AMRL-TR-75-50-VOL-142

NL

20
2010

END

DATE FILMED _____

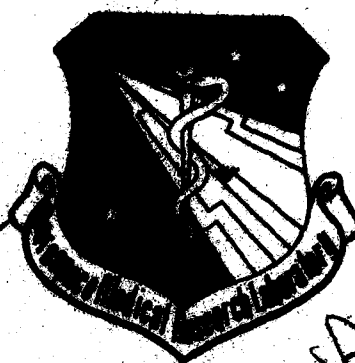
3 - 80

DDK

AMRL-TR-75-50
Volume 142

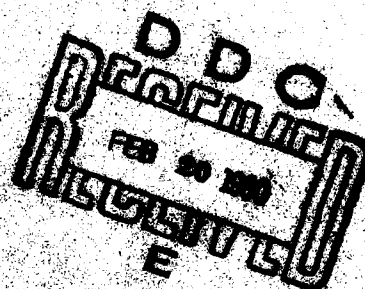
6

LEVEL



USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK
Volume 142
F-101B In-Flight Crew Noise

AVIATION



AUGUST 1979

156 935 / 0808
K 140 9411 A



REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER AMRL-TR-75-50 Vol-142	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK F-101B In-Flight Crew Noise Volume 142		5. TYPE OF REPORT & PERIOD COVERED Volume 142 of a Series
7. AUTHOR Harald K./Hille		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Aerospace Medical Research Laboratory Aerospace Medical Division, Air Force Systems Command, Wright-Patterson AFB OH 45433		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Same as above		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 62202F 7231-08-07 1702
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) 13. 12		12. REPORT DATE 10 August 1979
		13. NUMBER OF PAGES 12
		15. SECURITY CLASS. (of this report) Unclassified
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		15a. DECLASSIFICATION DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Noise F-101B Aircraft Noise Environments Bioenvironmental Noise In-Flight Crew Noise		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The F-101B is a two-seated, long-range, all-weather interceptor. This report provides measured data defining the bioacoustic environments at the pilot's location inside this aircraft for 15 flight conditions. Data are reported for one location in a wide variety of physical and psychoacoustic measures: overall and band sound pressure levels, C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and		

009850

limiting times for total daily exposure of personnel with and without standard Air Force ear protectors. Refer to Volume 1 of this handbook, "USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application," AMRL-TR-75-50(1) 1975, for discussion of the objective and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc.

PREFACE

This report was prepared by the Biodynamic Environment Branch, Aerospace Medical Research Laboratory, under Project/Task 723108, Crew Safety In Operational Noise Environments.

The author acknowledges the efforts of Mr. John N. Cole who established the data analysis requirements, Mr. Henry Mohlman and Mr. Fred Lampley of the University of Dayton who assisted in the mechanics of data processing and Mrs. Peggy Massie who typed this report and prepared it for publication.

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DDC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By _____	
Distribution/	
Availability Codes	
Dist.	Avail and/or special
A	

TABLE OF CONTENTS

	<i>Page</i>
INTRODUCTION	3
IN-FLIGHT NOISE	4

LIST OF TABLES

1. Measurement Location and Test Conditions for	
Noise Measurements	5
2. Measured Sound Pressure Level	
1/3 Octave Band	6
Octave Band	7
3. Measures of Human Noise Exposure	8

INTRODUCTION

The USAF F-101B is a two-seat long range all-weather interceptor manufactured by the McDonnell Aircraft Corporation. Power is provided by two J57-P-55 turbojet engines manufactured by the United Aircraft Corporation, Pratt & Whitney Aircraft Division.

This volume provides measured data defining the bioacoustic environments produced inside the aircraft. Such data are essential to evaluate ear protection requirements, limiting personnel exposure times, voice communication capabilities, and annoyance problems associated with operations of the F-101B aircraft.

This volume is one of a series published by the Aerospace Medical Research Laboratory (AMRL) under the same report number (AMRL-TR-75-50) as a multi-volume handbook that quantifies the noise environments produced at flight ground crew locations and in surrounding communities by operations of Air Force aircraft and ground support equipment. The far-field, community-type, noise data in the handbook describe the noise produced during *ground operations* of aircraft ground support equipment, and other ground-based equipment or facilities.

Volume 1 of this handbook discusses the objectives and design of the handbook, the types of data presented, measurement procedures, instrumentation, data processing, definitions of quantities, symbols, equations, applications, limitations, etc. *Refer to Volume 1* (reference 1) for such information because it is not repeated in other handbook volumes.

A cumulative index lists those aerospace systems contained in the handbook, and identifies the specific volumes containing each type of environmental noise data available (i.e., in-flight /flight crew and passenger noise, near-field/ground crew noise, far-field/community noise). Volume numbers are assigned sequentially as individual volumes are published. This index is periodically updated as individual volumes are published, and is available upon request from AMRL/BBE, Wright-Patterson AFB, OH 45433. Organizations on the distribution list for the handbook will automatically receive a copy of the updated index as it is generated.

Direct any questions concerning the technical data in this report and other handbook volumes to: AMRL BBE, Wright-Patterson AFB, OH 45433; Autovon 78-53675 or 78-53664; Commerical (513) 255-3675 or (513) 255-3664.

-
1. Cole, John N., *USAF Bioenvironmental Noise Data Handbook, Volume 1: Organization, Content and Application*. AMRL-TR-75-50 (1), Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio, 1975.

IN-FLIGHT NOISE

MEASUREMENTS

All noise measurements were made on-board a F-101B aircraft during typical speed, altitude, and flight maneuver conditions. These levels describe the standard F-101B environments but may not be representative of those levels encountered if the aircraft has been configured differently (e.g., major equipment or structural changes).

Acoustic measurements were made inside the cockpit at the pilot's location. Table 1 lists the measurement location and test conditions as numeric/alphabetic designators which are used on the data pages. The designator 1/A means measurement location 1 and test condition A, etc.

The microphone was attached to the pilot's helmet by means of a lightweight boom. This arrangement enabled adjustment of the microphone close to the ear level at a distance of 0.1 meter with its diaphragm parallel and facing away from the helmet's surface. In the analysis, microphone corrections for random incidence were applied to the overall system response. The recorded samples were analyzed using a four or eight second integration time to obtain a power-averaged level which effectively smooths out short duration fluctuations and best describes the exposure.



RESULTS

The measured data presented in Table 2 define the sound pressure levels (SPL) produced inside the F-101B aircraft at the specified location. This table includes the overall, 1/3 octave band, and octave band levels. From these data, C-weighted and A-weighted sound levels, maximum permissible time for one exposure per day (AFR 161-35) with and without standard Air Force ear protectors, preferred speech interference level, and perceived noise level are calculated and presented in Table 3. These measures are widely used to assess the effects of noise on personnel and their performance.

TABLE 1
MEASUREMENT LOCATIONS AND TEST CONDITIONS

F-101B, Tyndall AFB FL, 5 June 78

<i>Location</i>	<i>Position</i>	<i>Height Above Deck</i>
1	Pilot	Seated Head Level

<i>Condition</i>	<i>Description</i>
A	Ground Run Up, Engine #1 Engine Idle — Canopy Open
B	Ground Run Up, Engine #2 Engine Idle — Canopy Open
C	Ground Run Up — Both Engines Idle — Canopy Open
D	Ground Run Up — Both Engines 70% — Canopy Open
E	Taxi — Canopy Down
F	Engine Run Up — Canopy Closed
G	Takeoff — Roll
H	Takeoff — Gear Up
I	Climb 10,000'  25,000'PA
J	Cruise 25,000'PA — 83M
K	Descent 25,000'PA  — .69M
L	High Speed Run 1500' — 250KIAS
M	Approach Traffic Pattern
N	Landing Roll
O	Taxi — Canopy Closed

All Test Conditions are recorded with EC System settings at Normal — Comfortable

TABLE 1 MEASURED SOUND PRESSURE LEVEL (DB)															
1/3 OCTAVE BAND															
IDENTIFICATION:															
2) OMEGA 3.2														
) TEST AB-079-001															
) RUN 01															
))															
))															
) 31 MAY 79															
))															
) PAGE F1															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															
))															

L-VEL CORRECTED TO REMOVE BACKGROUND/ELECTRONIC NOISE.

TABLE: MEASURED SOUND PRESSURE LEVEL (DB)																
OCTAVE BAND																
2																
NOISE SOURCE/SUBJECT: (OPERATION:)																
F-101B AIRCRAFT ()																
IN-FLIGHT CREW NOISE ()																
()																
()																
LOCATION/CONDITION																
1/A 1/B 1/C 1/D 1/E 1/F 1/G 1/H 1/I 1/J 1/K 1/L 1/M 1/N 1/O																
FREQ (HZ)																
31.5	99	102	103	102	105	87	105	102	98	89	87	96	96	103	99	
63	90	94	94	92	93	91	101	100	100	90	90	101	101	99	95	
125	86	89	89	89	90	95	105	100	102	96	92	95	94	100	93	
250	90	92	92	92	88	91	97	94	99	96	91	94	92	90	85	
500	91	94	93	94	84	88	96	90	93	95	91	97	88	81	79	
1000	101	102	102	104	90	84	92	67	91	95	88	87	84	78	77	
2000	95	99	98	103	93	82	87	84	88	90	83	86	82	74	97	
4000	99	101	101	101	94	84	88	83	86	93	82	81	77	75	78	
8000	94	98	98	98	89	79	86	82	85	94	81	76	76	69	69	
OVERALL	106	108	108	109	106	99	108	106	106	103	98	104	103	106	103	

TABLE: MEASURES OF HUMAN NOISE EXPOSURE													
3													
IDENTIFICATION:													
NOISE SOURCE/SUBJECT: (OPERATION:)													
F-101B AIRCRAFT ()													
IN-FLIGHT CREW NOISE ()													
LOCATION/CONDITION													
1/A	1/B	1/C	1/D	1/E	1/F	1/G	1/H	1/I	1/J	1/K	1/L	1/M	1/N
HAZARD/PROTECTION													
C-WEIGHTED OVERALL SOUND LEVEL (OASLC IN DB) AT EAR													
A-WEIGHTED OVERALL SOUND LEVEL (OASLA IN DB) AT EAR													
MAXIMUM PERMISSIBLE TIME (T IN MINUTES) FOR ONE EXPOSURE PER DAY (AFR 151-3F, JULY 73)													
NO PROTECTION													
OASLC	15	107	137	108	103	98	105	106	113	98	174	103	175
OASLA	15	107	137	108	99	91	93	97	110	93	96	91	87
T	13	9	9	8	36	143	42	5	30	171	6	143	285
HGU-2A/P HELMET WITH H-154													
OASLA*	87	90	90	83	84	91	67	91	89	84	89	85	85
T	285	170	170	170	571	480	143	143	202	480	202	434	404
HGU-2A/P HELMET WITH H-154(A)													
OASLA*	83	85	85	78	80	87	84	87	85	90	84	82	82
T	571	404	404	339	960	960	285	285	404	960	460	679	679
HGU-2A/P HELMET WITH CUSTOM LINER													
OASLA*	38	99	99	83	87	94	90	94	94	39	93	88	86
T	+2	36	36	24	285	85	170	85	85	212	111	24	339
COMMUNICATION													
PREFERRED SPEECH INTERFERENCE LEVEL (PSIL IN DB)													
PSIL	96	98	98	99	89	84	87	91	94	97	91	85	78
ANNOYANCE													
PERCEIVED NOISE LEVEL, TONE CORRECTED (PNLT IN PND3)													
TONE CORRECTION (C IN DB)													
PNLT	121	121	121	122	115	108	110	113	116	107	111	107	106
C	3	1	1	1	2	1	1	2	1	1	2	1	1

* BASED ON CALCULATED SPL SPECTRUM UNDER PROTECTIVE DEVICE.